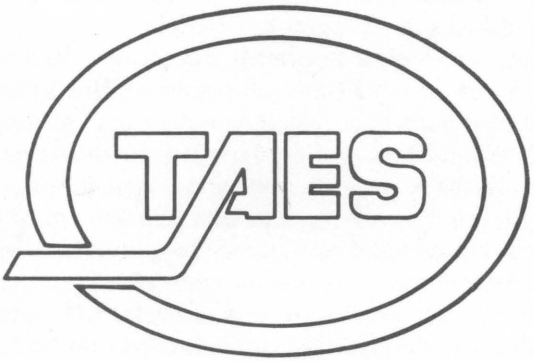
B-1433

Agricultural Research in Texas:

An Action Strategy



Preliminary Report
Task Force on Agriculture
Target 2000 Project
January 1983

Texas Agricultural Experiment Station

[Blank Page in Original Bulletin]

Preface

This publication is a condensed version of the preliminary report reviewing the Texas Agricultural Experiment Station (TAES) as a part of the Target 2000 Project. The structure and language of this report have been edited to facilitate reading and to meet format requirements of TAES publications.

The Target 2000 Project, initiated in the spring of 1981 by the Texas A&M University System Board of Regents, is a comprehensive analysis of each System component intended to provide guidance for long-range planning and development. Participants, comprised of a diverse group of leading Texas citizens, were separated into three task forces, academic, agriculture, and engineering, and further divided into work groups assigned a specific System agency or service. Each group was charged to study, discuss, and evaluate its unit and ultimately to write a report. A general four-part format was followed to allow integration of individual unit reports into an overall Task Force report. The four headings are: (1) Mission and Programs, (2) Clientele Served, (3) Resources, and (4) Organization, Management, and Interagency Relations. This format provided structure to work group deliberation and consistency to the several reports.

The TAES work group, looking toward the year 2000, was responsible for assessing major state issues and recommending an agricultural research agenda. The group first reviewed the present situation in Texas agriculture and then evaluated this industry's importance in the state's future growth. Using this perspective and recognizing the mission of the Agricultural Experiment Station, a set of recommendations was developed, which reflects keen insight into key contemporary and future issues. These recommendations, or *action strategies,* underscore the significant role agricultural research must play for successful economic development to be achieved in Texas.

[Blank Page in Original Bulletin]

TARGET 2000 PROJECT

SUMMARY OF RECOMMENDATIONS FOR THE TEXAS AGRICULTURAL EXPERIMENT STATION

PERSPECTIVE

The value of farm assets in Texas totals more than $84 billion; this is about three-fourths of the total capital assets of *all* state and national banks in Texas. Cash receipts from agricultural commodities in Texas were nearly $10 billion in 1981. Suppliers of farm inputs, food processors, distributors, and others all benefit from this agricultural enterprise; every one dollar of farm sales stimulates over $3.40 in economic activity in Texas. The total economic impact of agricultural production and related activities, $33.7 billion per year, is 18.3 percent of the Texas gross state product. Texas is the nation's number one producer of cattle and calves, cotton, and sorghum, and is second in terms of total agricultural receipts. Texas ranks among the top 10 states in production of 17 of the nation's top 25 commodities. Agribusiness ranked second among the major industries in Texas in 1981, and, unlike mineral income, income from agriculture is derived from a renewable resource.

The long-term global outlook for food and fiber requires a continuing increase in production to meet the demands of a growing world population. This *future* requirement could be met by U.S. agriculture given new technology and a favorable economic environment. In contrast, increasing costs of production, low commodity prices, high interest rates, and a national economic recession threaten the ability of the agricultural producer to stay in business *today*. The situation is particularly critical in Texas where production costs are high relative to other agricultural regions in the U.S. Increasing productivity offers one means of stabilizing the extreme variations in the agricultural production system. In recent years, escalating costs (especially for energy) relative to production and price have severely reduced the rate of productivity growth. New technology, developed through research, has a positive effect on both the input and output sides of the productivity equation.

Much of the current research within the Texas Agricultural Experiment Station is directed towards solving specific agricultural problems and improving the utilization of water, land, and other resources. Each geographical region of the state has unique resources and advantages as well as differing problems impacting agricultural production. Current research is developing more efficient and profitable production systems for each region. Ongoing research programs involve both basic and applied research. Basic research aims to gain a better understanding of fundamental plant and animal life processes and resource use. Applied research adapts basic knowledge into practical agricultural production systems.

New research efforts must be supported to develop innovative techniques such as non-polluting food processing methods, biodegradable pesticides and herbicides, and chemical feedstocks for energy. Application of state-of-the-art research technologies can result in unique products that require fewer inputs and have higher yields and nutritional value. It may be possible to develop non-legume nitrogen-fixing plants, crops tolerant to saltwater, new vaccines, bacteria for biodegradable pesticides and herbicides, and plant/animal tissue cultures as alternatives to landbased agriculture. Basic scientific discoveries and continuing efforts in research problems will lead to new agricultural methods that are less dependent on non-renewable resources and environmentally safe. Such discoveries are crucial to solving the critical issues confronting Texas agriculture.

IDENTIFIED CRITICAL ISSUES

- Water Availability and Cost
- Energy Availability and Cost
- Integrated Resource Use
- Marketing, Transportation, and Policy
- Production Efficiency
- Soils
- Weather Uncertainties
- Environmental Protection
- Safe and Nutritious Human Food Supply
- Urban Agriculture

PRIMARY RECOMMENDATIONS

***Expand the Texas Water Resources Institute* (TWRI)**

Water is the number one critical issue in Texas. An expanded program of research is needed to address the issues related to water development, conservation, and utilization. TWRI, with an established (20 years) record of administering a statewide research program, might be a vehicle for this expansion.

Strengthen Research in the Basic Sciences

Major advances in basic science are needed to help solve urgent problems in plant and animal production. A new initiative in molecular biology and related fields should be undertaken to create new technology and provide a better understanding of plant and animal processes. Teams of scientists should address such major issues as pest resistance and plant stress with the goal of manipulating basic processes using emerging technologies like genetic engineering.

Expand Information and Data Processing Systems

The complex problems addressed through research will require expanding and developing TAES computer capabilities and facilities. Computers must be used by both researchers and research clients for data management, information development, and problem solving. The development of computer models for decisionmakers in agriculture and the dissemination of research results via electronics and computers is a critical need.

Increase Research Focus on Production Efficiency

Animal and plant production is affected by a large number of variables, such as pests, weather, soil conditions, and cultural and management practices. The potential is great for improving production efficiency by influencing the way these variables impact animals and plants. Increased research is needed which will deal on an integrated basis with each new varietal development, culture practices, and production systems to exploit Texas advantages.

Establish a Center for Agricultural Policy

Policy at the federal and state levels has a significant impact on Texas agriculture. A stronger role in policy formulation is needed to reflect the special characteristics of agriculture in the Southwest. A policy center is needed to conduct research and educational programs on important regional and national issues affecting Texas agriculture.

Increase Investment in Research Facilities

Modern research requires new, sophisticated laboratories and equipment. Facilities and floorspace are critically needed to expand research programs in molecular biology and genetic engineering. Completion of the West Campus Master Plan will be vital to the research and teaching programs in agriculture. Continued expansion of facilities at the Research and Extension Centers will permit full development of the capacities of these units. Additional land is needed at College Station to accommodate expanding programs and to replace research lands lost to campus expansion.

Maintain the Strong Organizational Triad in Agriculture

Teaching, research, and extension programs are the fundamental components of the Land Grant concept and have served as major forces in the development of U.S. agriculture. A close organizational and working relationship among these functions in the Texas A&M University System is imperative if the needs of Texas agriculture are to be met. The ultimate organizational configuration of these functions to best serve agriculture should be based upon compatibility and cooperation within the University System.

Recognize Changes in TAES Clientele

The agricultural community served by TAES has undergone significant changes in composition during the last 30 years. Such change should be expected to continue as dual-income farmers, vertically integrated producers, and urban-oriented industries become a larger segment of the clientele. Adjustments in research programs and communications should be strengthened to provide necessary technologies to these groups.

GENERAL SUGGESTIONS

Mission and Programs

Texas agriculture faces several critical issues that will considerably alter its character by the year 2000. Research initiatives are urgently needed to sustain a viable and efficient agricultural system.

Water Availability and Cost

Texans currently use 7 million acre-feet more groundwater than are received each year. The state cannot support the present rate of growth without solving the water resource problem. Agriculture is the

major user of the Texas water resource. Research must develop new irrigation concepts, crop systems that reduce the extraction of soil moisture, more drought-, heat-, and salt-tolerant crops, and other new technologies to improve water efficiency in agricultural production.

Energy Availability and Cost

Texas agriculture has relatively high energy requirements and is more sensitive to rising energy costs than agriculture in other states. Much of our current agricultural production and processing technology is based on the expectation of abundant, readily available, inexpensive energy. This premise is not valid today. Improved crop production, efficient transportation, and distribution methods with reduced energy inputs, must be developed through research to compensate for increases in energy cost. Research must also continue on energy production from agricultural residues and on-farm application of alternative energy sources.

Integrated Resource Use

Population is growing at an unprecedented rate in Texas and will increase more than 40 percent by the year 2000. This population increase will stimulate development of all Texas resources and will increase the competition for resources essential in agricultural production. New research must investigate the implications of such resource development and explore methods for maintaining the long-range resource needs of Texas agriculture.

Marketing, Transportation, and Policy

Increased economic risk and uncertainty has characterized agriculture since the early 1970's. Generation and rapid circulation of timely information to Texas farmers and ranchers is vital for risk reduction and improved marketing. Research is required to assess the potential for handling facilities to accommodate modern transportation systems and improve the movement of agricultural commodities. Government agricultural policy proposals need to be carefully analyzed and evaluated concerning regional impacts before national policy is established.

Agricultural Production Efficiency

Present constraints in farm and ranch production include increasing conventional production costs and growing production risks; future perspectives include limitations on agricultural resources, complex production problems, and food shortages. Research must address both the short-term situation and the long-range problems. Programs

must target the Texas producer's need to reduce costs and favorably compete. Research effort must also focus on technology developme to adequately meet increasing demand for food and fiber.

Soils

Agricultural practices and production patterns will shift as producers adjust to economic changes, shrinking water supplies, loss of prime land, and use of marginal lands. These adjustments assure that erosion will continue to be a serious problem in many areas of Texas. Research must yield production methods which incorporate new soil utilization processes. Efficient use of agricultural inputs in these new systems combined with modern conservation practices are priority soil research areas.

Weather Uncertainties

Texas weather is extremely variable and agricultural risks are high. Droughts and periods of excessive rainfall seriously reduce agricultural output. Much of the weather uncertainty and related risk that Texas producers face can be reduced through research to develop adapted animal breeds, new crop varieties, and improved cultural and management practices. Programs must also be designed to accurately and rapidly assess weather-related regional economic impacts, particularly damage sustained through severe storms/floods.

Environmental Protection

Preserving environmental quality will continue to be of major concern to Texans in the future. Natural resources will be further degraded because of projected industrialization, urbanization, recreational and wildlife demands, expanded lignite mining, and agricultural intensification and expansion. To counter anticipated environmental degradation, current research activity must be expanded to reduce dependence on pesticides, water, artificial fertilizers, and to restore mined lands. Beneficial organisms need to be developed for control of pollutants, aquatic weeds, and pests.

Safe and Nutritious Human Food Supply

Food is America's most important renewable resource. U.S. consumers expect safe and nutritious food to be delivered at a cost considerably less, in proportion to total per capita income, than that of other countries in the world. Fundamental research must be conducted on nutritional values and optimal dietary constituents. In the long run, safe supplies of nutritious foods should be developed which will use the total resources of the agricultural food production com-

plex. Efficient processing, transportation, storage, and packaging of foods will be required to protect nutritional value and alleviate high costs.

Urban Agriculture

Many urban dwellers strive to improve the setting in which they live through the use of turf grasses, trees, shrubs, and landscape plants. New agricultural industries have developed in connection with these activities. Urban areas utilize the same land, water, and other resources that are used in conventional agricultural production. Research is necessary to develop improved plants and other products for urban use which conserve the natural resources needed for Texas food and fiber production.

CLIENTELE SERVED

The clientele served by TAES is a growing and diverse assemblage undergoing significant shifts in composition and structure. This group can be divided into two segments: 1. those who utilize agricultural research and 2. those who benefit from the application of agricultural research results. The first group is composed of various segments of the agricultural industry and the second can be identified as consumers, or, the general public.

Agricultural Community

The core group within the agricultural community served by TAES is that of primary producers of food and fiber products. Closely aligned with this group are the manufacturers of equipment, suppliers of other agricultural products and services, and bankers, who continually interface with producers to provide material support and technical information. Marketing organizations are important clients and include those organizations involved in transportation, processing, and merchandising of agricultural commodities. Servicing agencies and personnel, including the Texas Agricultural Extension Service and employees of other governmental institutions, are also a significant segment in the TAES clientele. Urban users of agricultural technology are an important growing clientele group. All of these clientele groups involve professional agriculturalists and the needs and successes of one group affect the actions of the others.

General Public

The general public is that part of society not included in the "agricultural community" but clearly impacted by contemporary agriculture. Daily, the consumer reaps the benefits of new agricultural technology. The public has grown to *expect* a generally high level of environmental quality as well as affordable, nutritious food and high-quality fiber.

RESOURCES

Substantial new resources will be required over the next 20 years to address the critical issues in agriculture through a first-class program of research. Six areas of emphasis have been identified for which new resources will be required.

Texas Water Resources Institute

Water is the most pervasive critical issue which will confront Texans in the next 50 years. The Texas Water Resources Institute is an ideal mechanism for administering a statewide program of water research. It is envisioned that the Institute should become the state's premier water research agency and major new resources are required to establish this capability.

Basic Science

Research in the basic sciences is the key to major technological advances in agriculture. Basic research has been seriously neglected in the agricultural sciences. Significant advances in agriculture will not likely occur without substantial new investments in basic research.

Computers

The computer is a powerful tool that can enhance management capability for a wide variety of agricultural enterprises. In order to bring computers into the mainstream of agriculture, major new funding is needed to develop a comprehensive computer package. Personnel trained in systems analysis and in programming, with access to modern computers, will be required to provide the needed research base.

Agricultural Policy Center

Policy at both state and federal levels continues to have a major impact on Texas agriculture. This impact is felt by producers, agribusiness interests, agricultural workers, and consumers. Public policies significantly affect prices received by farmers, prices paid for imports, and the competitive position of Texas agriculture. A Center for Agricultural Policy is needed to conduct research and educational

programs on the critical issues affecting Texas agriculture and on national policies impacting regional production.

Urban Centers

Metropolitan Centers and their surrounding agricultural communities are important population sectors requiring support from TAES. The Texas A&M University Research and Extension Center at Dallas has served as a model for integrating traditional agricultural research with the development of new technology having application in the urban community. Satisfying the agriculture product needs of industry and consumers in these urban areas benefits producers through the development of efficient processing and transportation facilities and by opening new market outlets. A vibrant agricultural industry has developed around ornamentals and commercial landscape industry and the urban homeowner.

Resources to Support Scientific Excellence

There is an urgent need to strengthen the support and service activities of TAES in order to increase the scientific capability of the agency. Experimental investigations in agriculture require a broad array of resources and facilities. There is a growing need for additional land at College Station, and the centers at San Angelo, Uvalde, and Corpus Christi. The West Campus Master Plan should be implemented as rapidly as possible to alleviate the serious space problem at College Station created by the rapid growth in Texas A&M University. Existing research laboratories need to be modernized. The Texas A&M Station contributes to a significant effort in marine-related research programs. The Texas A&M University System should establish a major marine research and teaching facility along the Texas Coast.

ORGANIZATION, MANAGEMENT, AND INTERAGENCY RELATIONS

The management techniques currently being employed provide for very effective communication between the Station personnel and the individuals/groups employing new research techniques and developed end products. This situation assures adequate planning, management, and accountability for the public resources entrusted to this agency. The organizational configuration of TAES is adequate to conduct a first-rate program of research during the next 20 years.

[Blank Page in Original Bulletin]

TAES WORK GROUP MEMBERS

Charles E. Ball, Chairman
Executive Vice President, Texas Cattle Feeders Association

Vernon L. Peckham, Vice Chairman
Senior Vice President, Agribusiness Division, Republic National Bank

Gabe D. Anderson, Jr.
President, Sherley-Anderson Elevators

Delvin R. Barrett
President, Feather Crest Farms, Inc.

David M. Britt
Rancher, Britt Ranch

Richard N. Conolly
Vice President and Director, Stewart and Stevenson Service, Inc.

William C. Donnell
Rancher; Past President TSCRA; Former Director, National Cattlemen's Assoc.

Charles Griffin, Jr.
Chairman of the Board, Uvalde Producers Feed Mill & Elevator Co.

Richard E. Haas
Rancher; Richard E. Haas Oil Operators

Don C. Larner
Rancher: Retired, Texas Water Development Board

William Lovelady
President, Texas Association Cotton Producer Organizations

Don H. Marble
President, High Plains Research Foundation

John L. Merrill
Rancher; Director, Ranch Management Program, Texas Christian University

Lewis M. Roberts
Retired, Rockefeller Foundation

Graddy Tunnell
Attorney-at-Law

The Texas Agricultural Experiment Station, Neville P. Clarke, Director, College Station, Texas, The Texas A&M University System

1M-1/83